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10/054,499	01/22/2002	Sungho Jin	Jin 205-28-1	4756

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EXAMINER

MOONEY, MICHAEL P

ART UNIT PAPER NUMBER

2883

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/054,499

Applicant(s)

JIN ET AL.

Examiner

Michael P. Mooney

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7, 9 -14 is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☒ Claim(s) 4-6 and 8 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-3 are rejected under 35 U.S.C. 103a as being unpatentable over Flanders (PG PUB 20030011864).

Flanders teaches an optical system comprising a curved micro-electro-mechanical (MEMS) mirror comprising: a mirror layer comprising a frame and at least one curved mirror movably coupled to the frame (fig. 5).

Although Flanders does not explicitly state the mirror having a maximum dimension "less than 3000 micrometers and a radius of curvature less than 200 millimeters" it would have been obvious to do so because Flanders does teach a "very small" (para. 0007) MEMS implementation and it is notoriously well known for such

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MEMs mirrors to have a maximum dimension less than 3000 micrometers and a radius of curvature less than 200 millimeters.

Furthermore, Flanders teaches an actuation layer disposed adjacent the mirror layer (fig. 5) comprising at least one actuator coupled to the curved mirror for controllably tilting the curved mirror (fig. 5; paragraphs 0039-0040).

Thus claim 1 is rejected.

Flanders teaches the optical system of claim 1 wherein the actuator comprises an electromechanical actuator. (Abstract). Thus claim 2 is rejected.

Although Flanders does not explicitly state the mirror having a maximum dimension "less than 1000 micrometers and a radius of curvature less than 80 millimeters" it would have been obvious to do so because Flanders does teach a "very small" (para. 0007) MEMS implementation and it is notoriously well known for such MEMs mirrors to have a maximum dimension less than 1000 micrometers and a radius of curvature less than 80 millimeters. Thus claim 3 is rejected.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Allowable Subject Matter

Claims 7, 9 -14 are allowed.

Claims 4-6, 8 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art, either alone or in combination, does not disclose or render obvious a the substrate having a thickness in the range 0.1-40 micrometers and the metal coating having a thickness in the range 5 nanometers to 5 micrometers in combination with the rest of claim 4 for the reasons stated by Applicant in the Remarks section filed 2/2/04.

It is noted that the claim 4 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious wherein the mirror layer comprises a metal-coated substrate having a pair of major surfaces, a thickness in the range 0.1-40 micrometers, and dopants implanted in the region of one major surface in sufficient concentration to curve the mirror to a radius of

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curvature less than 200 millimeters in combination with the rest of claim 7 for the reasons stated by Applicant in the Remarks section filed 2/2/04.

It is noted that the claim 7 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a method of making a device having a curved MEMS mirror providing a device having a mirror substrate with a maximum dimension less than 3000 micrometers, and implanting into the substrate in a surface region thereof, a sufficient concentration of dopants to curve at least a portion of the substrate to a radius of curvature less than 200 millimeters in combination with the rest of claim 9 for the reasons stated by Applicant in the Remarks section filed 2/2/04.

It is noted that the claim 9 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious a method of making including providing a device having a mirror substrate with a first thickness maximum dimension of less than 40 micrometers and a first coefficient of thermal expansion; coating the substrate with a coating of metal having a second thickness and a second coefficient of the thermal expansion; and heat treating the coated substrate to a temperature in the range 100-6000 C, the first and second coefficients and thicknesses and the heat treating temperature chosen to curve at least a portion of the coated substrate to a radius of curvature less than 200 millimeters in

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combination with the rest of claim 12 for the reasons stated by Applicant in the Remarks section filed 2/2/04.

It is noted that the claim 12 is allowable because the unique combination of each and every specific element stated in the claim.

The prior art, either alone or in combination, does not disclose or render obvious

An optical system including: a 1st optical fiber (OF); a 2nd OF; and a curved MEMs mirror to direct light from the 1st OF to the 2nd OF, the MEMs mirror comprising a frame and at least one mirror movably coupled to the frame, an actuation layer disposed adjacent the mirror layer including at least one actuator coupled to the mirror for controllably moving the mirror; the mirror having a maximum dimension of less than 300 micrometers and a radius of curvature of less than 200 millimeters in combination with the rest of claim 14 for the reasons stated by Applicant in the Remarks section filed 2/2/04.

It is noted that the claim 14 is allowable because the unique combination of each and every specific element stated in the claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael P. Mooney whose telephone number is 571-272-2422. The examiner can normally be reached during weekdays, M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1562.


Michael P. Mooney
Examiner

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Frank G. Font
Supervisory Patent Examiner
Art Unit 2883

FGF/mpm
11/29/04